

April 12, 2010

Mr. Stephen Hoffman
US Environmental Protection Agency
Two Potomac Yard
2733 S. Crystal Drive
5th Floor, N-237
Arlington, Virginia 22202-2733

Response to EPA Bruce Mansfield-Little Blue Run Recommendations
Enclosure 2
FirstEnergy Generation Corporation
Little Blue Run Dam – PADEP No., D04-049
Beaver County, Pennsylvania

Dear Mr. Hoffman:

GAI Consultants, Inc. (GAI) acting on behalf of FirstEnergy Generation Corporation (FirstEnergy) helped prepare this response to your letter dated March 8, 2010 concerning recommendations regarding maintenance and monitoring that will further enhance the condition of this dam. It is noted that the CHA's assessment of the Little Blue Run Dam indicates it to be in satisfactory condition. The recommendations sections referenced in the EPA final report are reproduced below with our responses including specific plans and schedules for implementing each of the recommendations.

4.2 Annual Report on Dam Condition

As part of our previously performed independent engineering review (Task 2) of the Little Blue Run Dam, CHA was tasked with reviewing annual inspection reports submitted to PA-DEP by FirstEnergy's engineering consultant. The GAI semiannual inspection reports reviewed by CHA do not include information regarding the location, size or age of the management unit. CHA recommends that the formats of the semiannual inspection reports be expanded to include this information.

Response:

The GAI semiannual inspection reports reviewed by CHA do 'include information regarding the location, size or age of the management unit' (management unit refers to the facility). This information is provided in every inspection report in the section titled DAM INSPECTION CHECKLIST. In this section the data provided includes the name of the facility, the PaDEP I.D. number, township and county in which the dam is located, the size and hazard classification of

the dam, height of dam embankment, normal pool storage capacity (acre-feet), normal pool elevation, Service and Secondary Spillway invert elevations and pool elevation at the time of the inspection. The age of the facility can be obtained from the as-built Plan View of Instrumentation which is also included in every inspection report. In future inspection reports, the date of construction and date the facility went into service will be more clearly delineated.

4.3 Left Abutment Seepage Investigation

The PA-DEP Dam Safety Inspection Notice dated January 26, 2009 noted that the flow of water from numerous seeps on the left abutment is quite high. The PA-DEP recommends that a subsurface investigation be performed on the left abutment that includes rock coring in conjunction with pressure testing and the installation of piezometers. The results of the pressure testing could be compared to pressure testing conducted with the original foundation investigation prior to the dam's construction. This would also help to define the current permeability profile from the top of the embankment at about Elevation 1,100 feet through the toe of the dam at about Elevation 700 feet.

CHA recommends that FirstEnergy perform the subsurface investigation as outlined by PA-DEP. According to PA-DEP, the subsurface investigation plan was approved with the stipulation that the piezometers depths be submitted and approved prior to installation and be based on drilling results and apparent water level elevations. The borings are expected to be completed in the spring of 2010.

Response:

FirstEnergy has submitted a plan "Drive Sample Boring and Sampling, Core Drilling, Borehole Packer Pressure Testing and Open-Tube Piezometer Installation" for the purpose of conducting a geotechnical investigation on the left abutment of the Little Blue Run Dam. The plan has been submitted to the Pennsylvania Department of Environmental Protection (PaDEP), Division of Dam Safety (Division) and has been approved by the Division pending response to two minor comments in their letter dated March 2, 2010. The final proposed geotechnical investigation proposal is currently under review by FirstEnergy and will be forwarded to the Division at which time the Division will issue an authorization letter to proceed with the proposed work and piezometer installation. The work is anticipated to start in May 2010. A final report with conclusions and recommendations will be submitted later in the summer of 2010. It is the intent for FirstEnergy and GAI to work with the Division and keep them updated as the work progresses.

4.4 Installation of Piezometers

The PA-DEP recommended that additional piezometers be installed within the central portion of the embankment. It was recommended that at a minimum two borings with multiple tip piezometers be installed and screened at elevations from 800 to 900 feet within the central portion of the embankment. These additional piezometers will be used to detect the current phreatic surface within the dam and to monitor the embankment for any impacts from efforts to reduce seepage through the left abutment.

Response:

There is no intent at this time to install additional piezometers in the central portion of the dam's embankment. Piezometers installed as recommended by PA-DEP would be located downstream of the core and the inclined filter. The phreatic surface is drawn down within the inclined filter which would result in dry piezometers at these proposed locations. The inclined

filter connects to the foundation filter blanket that extends up the abutments, intercepting seepage and directing it to discharge at the downstream toe drain (Stilling Basin). Since two piezometers (UD-1 and UD-2) are already monitoring water level elevations within the foundation filter blanket GAI believes it to be unnecessary to install additional piezometers in the central portion of the dam embankment. Furthermore, piezometers installed in the central portion of the dam embankment at the proposed locations could not be used to 'monitor the embankment for any impacts from efforts to reduce seepage through the left abutment' since the central portion of the dam embankment is effectively isolated from the abutments by the foundation filter blanket.

4.5 Installation of Inclinometers

The slope movements that have occurred since 2001 have been described as surficial and within the soil horizon. The PA-DEP recommended that inclinometers be installed to check for more deep-seated movement, possibly along soft clay seams inter-bedded with more durable rock that may be found during the subsurface investigation. CHA recommends that additional inclinometers be installed as outlined by the PA-DEP.

Response:

Slope inclinometers may be installed in the future pending the outcome of the geotechnical investigation and review by the Division.

4.6 Stability Analysis

CHA was not provided with a maximum surcharge (flood condition) loading condition analysis, which while not specifically required under PA-DEP regulations, the US Army Corps of Engineers guidelines in EM-1110-2-1902 suggests a factor of safety under flood conditions of 1.4.

The calculated factor of safety for the rapid drawdown loading condition (1.1) is below the suggested US Army Corps of Engineers guidelines (1.3 for rapid drawdown from maximum storage pool) as shown in Section 3.3. CHA understands that it is undesirable to rapidly evacuate water containing CCW from the impoundment. Reportedly rapid drawdown is only possible via pumping off supernatant water above the sludge level at high volume flow rates. CHA suggests that in the event of an emergency at the dam (the classic rapid drawdown scenario) it may be favorable to evacuate impounded water to reduce stresses on the dam to reduce the risk of an uncontrolled release in the event of failure.

The last reported stability analysis performed for the Little Blue Run Dam embankment was in 1977, with the results shown on the As-Built Drawings. CHA recommends that an updated stability analysis be performed following the proposed subsurface investigation and installation of piezometers as outlined by the PA-DEP. Data from the new piezometer (and replacement piezometers) should be used to model the current phreatic surface in the embankment. Loading conditions which should be analyzed include those shown in Table 3 in Section 3.3, including the maximum surcharge loading condition which was not previously considered.

Response:

CHA is correct in their assessment that the extra stability analysis necessary to determine the factor of safety on the downstream slope under flood conditions is not specifically required under PA-DEP regulations. The Pennsylvania Code, Chapter 289, Residual Waste Disposal

Impoundments does not evaluate embankment stability based on all the conditions addressed in U.S Army Corps of Engineers guidelines, Table 3-1 of EM-1119-2-1902. The Pennsylvania Code, Subsection 289.271.(a) (3) states that "the dike shall be capable of withstanding anticipated static and dynamic loadings with minimum safety factor for the most critical failure surface of 1.5 for static loading and 1.2 for dynamic loading". Should PA-DEP regulations be modified to require this additional analysis as to also meet the US Army Corps of Engineers guidelines in Table 3-1 of EM-1110-2-1902, FirstEnergy will authorize the evaluation should this become a new requirement.

As stated above, Subsection 289.271.(a) (3) of the Pennsylvania Code requires that "the dike shall be capable of withstanding anticipated static and dynamic loadings with minimum safety factor for the most critical failure surface of 1.5 for static loading and 1.2 for dynamic loading". This criteria is met with the single exception being the stability circle shown on CHA's Figure 7 (taken from GAI's 1974 stability analysis of April 1, 1974) which shows an upstream surficial failure surface with a factor of safety of 1.1. This condition should not influence the overall stability of the impoundment since the rapid drawdown conditions modeled in the 1974 analysis (with no sludge solids in the impoundment) do not exist at this time. Furthermore, the current level of sludge solids behind the dam varies from Elevation 1040 to 1070 or higher, providing additional buttressing to the upstream slope.

The last reported stability analysis performed for the Little Blue Run Dam embankment was in 1993 to evaluate Little Blue Run Dam to determine if the embankment would meet the minimum stability requirements of Chapter 289.271. (a) (3) of "SUBCHAPTER C. OPERATING REQUIREMENTS IMPOUNDMENTS", of the Pennsylvania Residual Waste Management Rules and Regulations which were promulgated in 1992. The results of the 1993 stability analyses show that for significantly deep circles through the upstream face the estimated minimum factor of safety under seismic conditions was greater than the minimum value required by Subsection 289.271.(a) (3) of 1.2. As previously stated, sludge solids behind the dam currently varies from Elevation 1040 to 1070 or higher, providing additional buttressing to the upstream slope. In addition, as stated in 4.4 Installation of Piezometers, piezometers installed in the downstream central portion of the dam embankment would be dry as the phreatic surface is drawn down within the inclined filter.

4.7 Settlement of Geotubes

It was recommended that the settlement of the geotubes that are retaining waste in the upper part of the valleys be monitored quantitatively. CHA recommends that the monitoring of the geotubes be performed at the same frequency as the surface monuments and the results be included in the semi-annual reports prepared and submitted to the PA-DEP.

Response:

Monitoring settlement of the geotubes is conducted at the time of their construction then again some months following installation. Regular monitoring of geotube settlement is not conducted since the geotubes are eventually intentionally buried by additional sludge solids. The geotube settlement data that is gathered is provided to the PaDEP, Division of Solid Waste Management. In the future, this data will be added to the annual dam inspection report that is reported to the Division.

4.8 Little Blue Run Saddle Dam

4.8.1 Seepage

The January 2009 PA-DEP inspection report noted that the valley below the saddle dam has been impacted by leachate and there is a pump return system for this water. It was recommended that the leakage in the valley and in the Mill Creek valley be evaluated.

Response:

Water is sampled at the pump return system and the analysis results are submitted to the PaDEP, Division of Waste Management quarterly. The "leakage" in the valley has no relationship to the saddle dam.

4.8.2 Subsurface Investigation

The PA-DEP recommends that a subsurface investigation be conducted on the saddle dam as very little information is available about its original construction. The investigation should include the installation of piezometers. It should also be noted that the continued operation and maintenance of the saddle dam will require a dam permit from PA-DEP. Any modifications that may be found to be necessary as a result of the subsurface investigation and analysis will be required as part of the dam permit application process.

Response:

Information regarding the original construction of the saddle dam was retrieved from GAI's archive and forwarded to the Division. Data includes construction specifications, construction photographs, "as-built" plan and embankment cross sections, geotechnical site investigation reports with test pit logs, "as-built" borrow area plan and index of soil properties and an 11 page stability analysis calculation brief.

It is not planned to install piezometers at this time since the normal operating pool of the impoundment is below the upstream toe of the dam embankment.

The saddle dam is currently in the process of being permitted through PA-DEP. A breach analysis has been performed and the required emergency action plan has been completed. The saddle dam has been assigned PaDEP I.D. No. D04-068.

The saddle dam will continue to be observed twice a year when the main Little Blue Run Dam is inspected. Also, the formal, required annual dam inspection report will be submitted to the Division at the end of each year.

4.8.3 Animal Control and Filling of Existing Animal Burrows

Evidence of animal burrows was observed on the embankment slopes of the Little Blue Run Saddle Dam. CHA recommends that FirstEnergy keep notes of areas disturbed by animal activity, trapping of the animals, and repair to the areas.

Response:

Animal burrows on the embankment are reported to FirstEnergy whenever they are observed. They are then promptly filled.

4.8.4 Maintaining Vegetation Control

Appropriate grasses covered most of the Little Blue Run Saddle Dam embankments. However, there was a patch of brambles extending from the downstream toe to the crest of the embankment that requires cutting and/or removal in order to properly observe the embankment.

Response:

The above referenced patch of brambles has been removed. The dam embankment is mowed on a regular basis.

FirstEnergy appreciates the time and effort CHA put into inspecting and assessing our facility. We also thank you for the opportunity to review their comments, respond, and provide additional and/or clarifying information. If you have any questions please contact me at 330-384-5964.

Sincerely,

Mr. Michael L. Horvath, P.E.
Manager, Environmental Governance

SRM/lrc
9151160-epa response ltr-srm/lrc D-1



Update on Little Blue Run Dam Discussions with PaDEP

horvathm to: James Kohler

Cc: lonnettr, rlevans

08/25/2010 12:17 PM

Dear Jim,

Recently you asked for an update on how FirstEnergy and PaDEP were doing in deciding what, if any, additional analysis would be done on the dam. As usual, when technical matters are discussed, GAI Consultants (who designed and monitor the dam) gave their viewpoints and PaDEP Dam Safety Office presented their viewpoints. In the end they came to agreement as you reported during our telephone discussion. Here is what is being done:

1. Two borings from the top of the dam will extend down beyond 100 feet as long as the drill can advance that deep. The stability analysis will then be rerun by GAI incorporating data from the borings. Results will be reported to PaDEP. That work is expected to begin by the end of September if the proper drilling rig can be shipped to the site in a timely manner.
 2. Eight shallow borings along the dam surface will be attempted to install additional lysimeters along the west dam abutment. Again, results will be reported to PaDEP. That work is underway now with some drilling difficulty due to the hardness of the materials being drilled.
- You are up to date. If you have any questions please do not hesitate to call me at 330-384-5964.

Mike

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Comments on FirstEnergy's response to the "Bruce Mansfield-Little Blue Run Recommendations"

Dam Safety has reviewed First Energy's response to the Final Assessment Report Recommendations. Dam Safety has the following comments in regards to the noted responses:

4.4 Installation of Piezometers

Dam Safety has noted First Energy's response to the installation of piezometers within the central portion of the dam. Based on their response, Dam Safety will review this information and determine how to address our concerns. Dam Safety still feels that the piezometers are necessary to monitor the affects of the left abutment work. Certainly seepage may pass through the abutment and back into the embankment downstream of the core and filter. Also, because 19 of the original 22 embankment piezometers are either abandoned or questionable, additional piezometers are needed to monitor the effectiveness of the core and chimney drain. Future discussions between First Energy, GAI, and Dam Safety concerning alternate locations for the piezometers is warranted and will be scheduled.

4.5 Installation of Inclinometers.

Dam Safety concurs with GAI in that inclinometers will be considered after the left abutment subsurface investigation is complete the spring.

4.6 Stability Analysis

At the current time, Dam Safety has not requested that a new Stability Analysis be performed. Pending the results of the left abutment investigation, Dam Safety may also request that an updated Stability Analysis be performed.

4.7 Settlement of Geotubes

Dam Safety requested that First Energy provide monitoring data concerning the construction and settlement of the geotubes. This information was received from First Energy and will be reviewed when time permits. Settlement data presented in the Semi-Annual Reports is also appreciated and will be reviewed.

4.8.2 Saddle Dam Subsurface Investigation

Dam Safety has received the information from First Energy concerning the construction of the saddle dam. We will review the information to determine if a subsurface investigation is still warranted.